

countries more than it would the U.S. "There's a lot in it for us," says Ed Sarachik, who headed a National Academy of Sciences advisory panel on El Niño prediction. "If you realize that weather and climate are the source of lots of global instability, and Brazil owes U.S. banks billions, anything that helps them repay, helps us. Worldwide, I can't think of another way to help ourselves and buy that much goodwill for \$20 million."

THE JUNGLE, MILLIONS of years old, is lush on the Panamanian island of Barro Colorado. Some of its kapok trees, wide enough for a road to pass through, were here when the conquistadors arrived around 1530. Each

limb, decked with vines, orchids and other epiphytes, is an ecosystem unto itself. For 70 years, this hilly jungle has been the most studied and documented tropical forest on earth. On one plot of 140 acres or so, every tree and bush – 250,000 in all – has been tagged and tracked for years.

The 1982 El Niño caused a drought here that was so severe, the biologists say, it killed big trees and dried up the seasonal rainfall. Some 22 different tree species in the plot have been in decline since then, and many will disappear from Barro Colorado's forests altogether

– and probably across larger areas of the Central American tropics – unless the old moisture patterns return.

Rick Condit, a Smithsonian researcher, says that sudden and dramatic shifts like this in vegetation have happened before. It makes him think that in the past 2,000 years, "the tropics may be less stable, more balanced on an edge of change than we have thought."

And the balance may be shifting

El Niños coming as frequently as they have in the last 20 years are about one in 2,000 – or, put another way, one might expect to see it happen every 20 centuries. And an El Niño as lengthy as the last one might occur once every 1,500 to 3,000 years. As a scientist trained to make judgments based on statistics, not hunches, Trenberth can conclude that something is up with El Niño. But he can't conclusively say global warming

The overall increase is consistent with the world as a whole, says Thomas Karl, senior scientist at the National Oceanic and Atmospheric Administration's National Climatic Data Center, in Asheville, N.C.

We're seeing more precipitation, too. Since 1970, the average number of days with precipitation is up – about six more days a year than there used to be. More significantly, there has been a steady in-

The sudden and dramatic shifts in the vegetation that have recently occurred in the tropics, says one El Niño expert, "are what we'd expect to see in global warming."

again. There are hints that something may be altering the great alterer of climate. Kevin Trenberth, a New Zealand native and an expert on El Niños, thinks that around 1976, something unusual began happening to El Niños. "And in the '90s, it got very unusual," he says. So much so, he hypothesized, that it might not be simply natural variation. Analyzing the El Niños of the past two years, he found an increase in their occurrence in the past two decades and by far the longest El Niño of all – 66 months – lasting from 1989-95.

Trenberth calculates that the odds of

is to blame.

"It is not impossible that it is all natural variability," Trenberth says, "but a better interpretation is that a change in the global climate is responsible. It's the sort of thing we'd expect to see in global warming."

During the course of the 20th century, average daily temperatures in the U.S. have risen one-half to three-quarters of a degree. As with so much of weather and climate, it has not been an uninterrupted climb. Temperatures warmed in the 1930s, cooled from the 1950s to the 1970s, and, since then, have risen most rapidly,

increase in extremely heavy (greater than two inches a day) rain, snow and hailstorms across much of the country. There is about a 10 percent chance that this could be normal variability. But, says Karl, "it's unlikely that this increase can be easily explained by natural climate variability."

The center compiles a Climate Extremes Index, which averages several indicators, such as percentages of the country with above- and below-normal temperatures, above- and below-normal rain and snow, and severe drought and flooding. The index suggests that the



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